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POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy.

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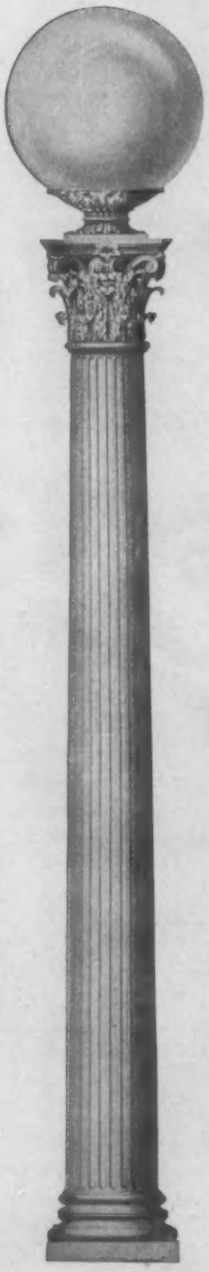

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POWER AND GAS

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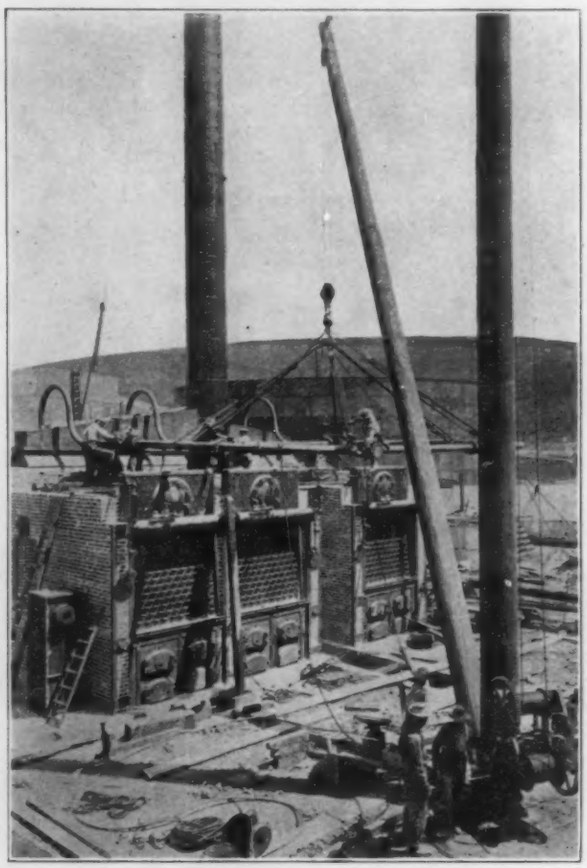
VOLUME XXI. SAN FRANCISCO, NOVEMBER 21, 1908 NUMBER 21

CARRYING OUT A CONTRACT

By A. L. Menzin.

In this active age, when the carrying out of big undertakings is a rather common occurrence, the erection of a boiler room installation aggregating 750 horse-power is hardly worthy of special notice. But when there are to be twelve of these installations, scattered over a distance of 260 miles and situated, more often than not, in isolated places beyond convenient distance from the nearest towns, the problems to be solved by the contractor who undertakes to do this work are not without interest, especially when time of completion is an important element.

The 65-Foot Smoke Stack Swinging in Mid-Air



Erecting The Main Steam Loop

On May 24th, 1907, The Tracy Engineering Co., of San Francisco and Los Angeles, was awarded the contract to furnish and install the boiler room equipment for a series of pumping stations to be used for pumping crude petroleum from the Kern oil fields in Southern California to tidewater at Port Costa. The method selected for transporting the oil is entirely different from that hitherto used, and was only successfully developed after spending a large amount of money on experimental work.

Oil and water are forced by separate pumps into the conveying pipe, which is made of steel and rifled with indentations so that the liquids will take on a rotary motion as they advance. This motion maintains the separation of the liquids by centrifugal force—the water remaining nearest the inner surface of the pipe and thus greatly reducing the frictional resistance offered to the moving oil. The oil is pumped from station to station after passing through settling tanks, to give the liquids a chance to separate and for operating reasons. The method of pumping and the equipment of the stations have been described in a previous issue.*

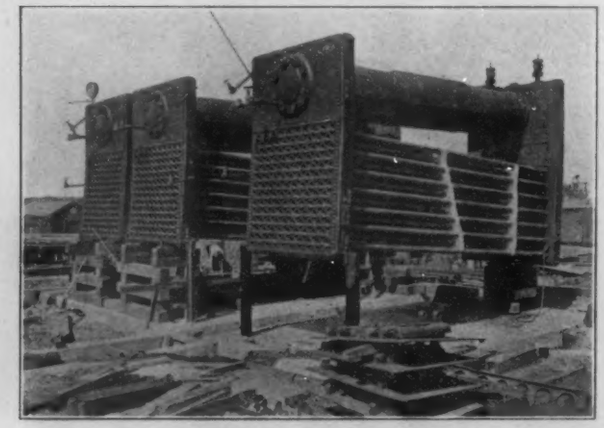
* JOURNAL OF ELECTRICITY, POWER AND GAS, Oct. 3, 1908.

The locations selected for these pumping plants are along the main line track of the Southern Pacific Company, running from San Francisco to Los Angeles, by way of Fresno. Spur tracks were built so that materials could be unloaded at the immediate sites of the plants.

Each boiler plant consists of three 250-horse-power Edge Moor water tube boilers, two feed pumps, an oil set, an open feed water heater and a 2½ K. W. generator set. The stack is of steel and is 48 inches in diameter and 80 feet high. The piping is of the loop system and is built for a working pressure of 175 pounds per square inch.

It may be of interest to note the weights of the various materials which make up the boiler-room equipment of the twelve stations.

Boiler parts	725 tons
Materials for brickwork	1668 tons
Piping materials and valves	73 tons
Pipe and boiler covering	16 tons
Stock materials	51 tons
Auxiliaries	42 tons
Total	2575 tons



Boilers Ready for Brickwork. To the Left is Shown One of the Portable Houses in Which the Men Slept

As this weight had to be transported from the East, from San Francisco, Los Angeles or other local points, the freight alone on this job amounted to a considerable sum. Including the freight paid for moving the erector's equipment from station to station, the freight item on this contract amounted to very nearly $35,000.

To carry out the work economically and with despatch required a good organization in the field. Six separate crews were organized, each being in charge of a competent foreman. There was one rigger crew for handling the derricks, unloading heavy parts and erecting stacks, two boiler erecting crews, one brick crew, and two piping crews. These crews were under the direct supervision of a general field superintendent, whose headquarters were first at Bakersfield and later at Fresno. A five-passenger automobile and a chauffeur were provided for his use and proved almost indispensable in enabling him to keep in close touch with the erecting crews and as a time-saver when men or supplies were needed in a hurry.

Work was carried on progressively at several stations at one time, beginning with the one furthest south. The rigger crew unloaded the boilers, the erecting crew put them up, and the brick crew bricked them in. After the brickwork was up, the rigger crew erected the stack and a piping crew put up the piping and auxiliaries. Thus one crew followed the other with very little lost time and without confusion.

With a few exceptions, the plants are located at some distance from the nearest towns, and therefore the problem of satisfactorily boarding and lodging the men had to be solved before much work could be done. Portable wooden houses were built especially for this job. These, together with box cars, provided comfortable eating and sleeping accommodations for the men. The contractors organized their own commissary. Three of the crews were provided with portable kitchen outfits, each of which had its own cook, a full set of cooking utensils and dishes, and storage facilities for provisions. The foreman of the crew acted as camp steward in addition to his other duties, and the selection of proper eatables was left to his judgment. These were, for the most part, shipped to the nearest town by express and taken to camp by the most convenient means which presented itself. Some of the crews were provided with bicycles to provide quick transportation to town when supplies gave out.

The food was not of the "salt-horse" variety, but was on a par with that served in the best middle-class homes in the cities. The men were charged twenty-five cents a meal, but at this price the commissary was run at a loss on account of the quality of the food served. This financial loss was, however, more than made up by the increased efficiency of the men, due to the good health and general contentment which prevailed.

To facilitate the unloading and erection of the heavy parts, four 12-ton derricks and two smaller derricks were built especially for this job. This made it possible to carry on the heavy erecting work at four different stations at one time. The smaller derricks were used for erecting the larger ones, and in connection with the large ones for erecting the stacks, as shown in the accompanying picture. The stack proper is 65 feet long and, when in place, the stack band is 80 feet from the ground. Using the method shown, the rigger crew could put up one of these stacks in about a half a day.

The masts and booms of the large derricks were of such size and the derricks were so placed that all the heavy parts could be lifted off the cars and set in their permanent locations with but one setting of the derrick at any particular station.

Owing to the isolated locations of the stations and to the necessity of having a derrick erected for unloading purposes, it required considerable scheming on the part of the management to issue shipping instructions for the materials required, in order not to delay the erecting crews by having the materials come too late, and to avoid paying costly demurrage charges by having the materials come too early.

The work of erection was begun in November, 1907, and was completed early in July, 1908. Thus in a period of about eight months, thirty-six water tube boilers were erected and bricked in, twelve stacks, twelve sets of auxiliaries and twelve sets of main and auxiliary steam piping were erected. Much good-natured rivalry was shown by the several crews in their efforts to outdo each other in excellence of work and time of completion. The resulting harmony had a very wholesome effect in making the execution of this particular contract unusually satisfactory.

ELECTRICITY IN JAPAN.

The authorized capital of electric undertakings in 1903, 28,500,000 yen ($14,193,000), of which 24,000,000 yen ($11,952,000) was paid up, had risen to 138,000,000 yen ($68,724,000) in 1907, of which 87,500,000 yen ($43,575,000) was paid up. The electric works undertaken chiefly represented lighting and tramways. The number of light supplied in 1903, 365,000, had increased in 1907 to 859,143. Tokyo and Osaka require, each, 100,000 lights. Electric tramways show equal edevelopment. In 1903 the mileage was 38, which rose to 119 in 1907, and will be largely added to by construction during the present year.

TESTS ON ELECTRIC SMELTING OF IRON ORE.*

By E. C. Elwell.

The seventh run of the single-phase experimental electric furnace of the Noble Electric Steel Co., at Heroult, Shasta County, has just been completed. The furnace was run from 7 a. m., August 25th, until 7 p. m., October 3rd, a period of thirty-nine days, and was shut down while running at its best, in order to obtain data relating to the exact distribution of the charge when the furnace is running normally. In this period a total of thirty-five tons of pig iron was produced, with an energy expenditure of 11.34 kilowatt-years, or an average of .324 kilowatt-year per ton of pig iron produced.

The run may be properly divided into two parts. For the first twenty-five days the 160-kilowatt transformer was used, and fourteen tons of iron were produced, with an expenditure of 6.09 kilowatt-years, or an average of .435 kilowatt-year per ton. It appeared that this was too little power for the furnace, and so a 500-kilowatt transformer delivering current at a pressure of fifty volts, was connected to the furnace. This allowed the furnace to take all the energy which it required at this voltage, and it promptly took about 200 kilowatts. It was not found to be so advantageous to have a fixed voltage as to have a variable, as it was difficult at times to get the furnace to take its full quota of energy after tapping for example. In spite of this, in the fourteen days of this period the furnace made twenty-one tons, with an expenditure of 5.25 kilowatt-years, or an average of .250 kilowatt-year per ton. The furnace was then shut down, as before noted.

A portion of the graphical log showing the performance of the furnace for the last seven days is shown, together with a summary showing the energy used, pig iron produced, etc. The figures are worthy of notice. It is seen that an average of nearly one ton and a half of iron were produced per diem at a cost of .262 kilowatt-year per ton, or $4.20 per ton for electric energy. If this figure can be obtained with such a small furnace as one of 200-kilowatt nominal rating (the average load was 154 kilowatts), in which quite a percentage is given up in losses, then the prospects for the realization of a better figure with a larger furnace are indeed bright.

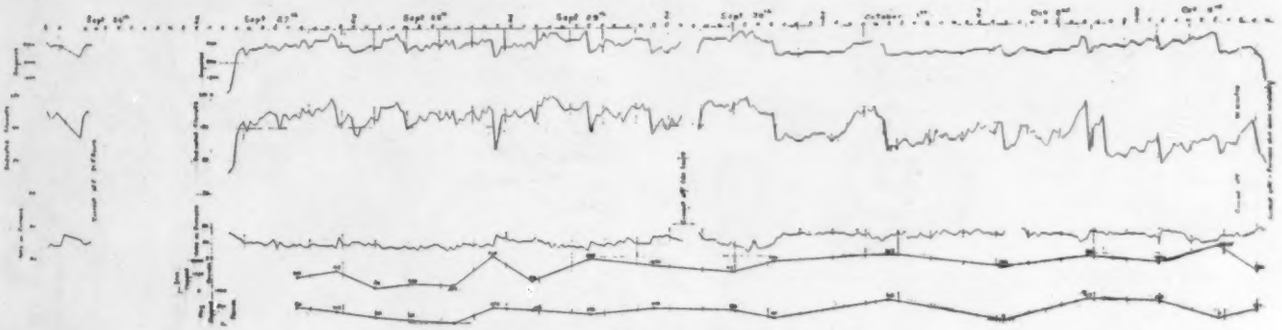
The figure for the whole run from the time current was switched on until it was switched off, was .324 kilowatt-year per ton, or $5.18 per ton for electrical energy. The legitimate figure to take, however, is the one for the second period, where twenty-one tons were produced at an average expenditure of .25 kilowatt-year per ton, or $4.00 per ton, for electrical energy. The figure for the last week is a fair average figure for this size of furnace.

*A full description of this new furnace was published in the "Journal of Electricity, Power and Gas," of July 18, 1908.

The Noble Electric Steel Co. is now building a 1,500-kilowatt furnace, which, on the basis of the above results, ought to have no difficulty in producing fifteen tons per diem as a minimum, and twenty tons ought not to be out of the way. Taking into consideration the low cost of furnace, labor and electrical energy, there seems to be no reason why iron cannot be made at the plant for $16 per ton, a very conservative estimate. With iron successfully produced at that figure, it will not be long before more furnaces are installed, and a long-felt want on the Pacific Coast will be supplied. The problem has not been one of making pig iron so much as to build a furnace which would stand the excessive internal heat. After a run of thirty-nine days it seems as if this is also solved. The condition of the furnace showed no reason why it should not have been run for three or six months, or longer.

Sixth Week.

Date	Date	Hrs.	K.W. Hrs.	K.W. Yrs.	Iron in lbs.	K.W.Yr. per ton
Sept. 27	28	24	4580	.523	2238	.468
28	29	24	4630	.537	3418	.312
29	30	22	4200	.479	3389	.282
30	1	24	3870	.442	2758	.320
1	2	24	2850	.326	3463	.188
2	3	23	3450	.394	3327	.236
3		12	1610	.184	3309	.111
			25190	2.88	21902	.262



Graphical Log Showing Performance of Electric Furnace

The iron for smelting is being furnished by the Shasta Iron Company, whose mine on the Pitt River is a part of the great ore deposit lying along the McCloud River. This occurs between the lime-stone bed and the adjacent country rock for several miles. Iron has been shipped from this district since 1884, much of it having been used as flux in the Bully Hill Smelter at De Lamar. The ore is magnetite carrying from fifty per cent to seventy-five per cent iron, the average value probably being sixty-five per cent, with little sulphur or phosphorus. The Noble Electric Steel Company has obtained options on several properties in this section, and have ample ore for years to come if their experiments continue successful.

CONSOLIDATION OF PERIODICALS.

The Electrical Review Publishing Company, of New York, publisher of the *Electrical Review*, has purchased the *Western Electrician*, of Chicago, and the two papers have been consolidated, with publication offices at Chicago.

ATTITUDE OF THE LAW TOWARD ELECTRICITY.

By Emerson W. Read.

It never can be an easy matter to determine when and when not a company is negligent in maintaining and conducting its wires. In one instance, Thomas vs. Marysville Gas Co., (108 Ky. 224), a court of high learning went so far in its effort to attach liability for negligence that it passed the trolley company whose wires caused the injury and held it the duty of the electric company supplying power to such trolley company to see that the lines of the trolley company were insulated before the current was allowed to course in the power lines of the trolley company. Undoubtedly this decision goes too far. It has been questioned by courts and writers and, undoubtedly, is not the law generally. Pacific Coast tribunals would limit the liability to the trolley company and allow the liabilities to go no further.

Perhaps a Western decision more closely and perfectly fixes the liability arising in such cases, to-wit: cases where carelessness in maintaining or establishing electrical wiring results in injury when the current is sent into the system of wires of the company. National Fire Insurance Co. vs. Denver, etc. Elec. Co. (63 Pac. 949) had these facts. The owner of the building employed contractors to install electrical fixtures in a building. The work of wiring was done carelessly and without proper insulating protection. The defendant company was employed to furnish light to the house and current was sent into the defective wiring, as a consequence of which the building was destroyed. Following the correct rule the light company could not be held liable, for the fault lay elsewhere. Nor was any liability imposed upon the company furnishing the current for damages that would result when its current passed into wiring, defective as a result of a third person's fault.

Liability attaches to that person or corporation operating the wires or the plant at the time the damage is done. Instances are known where an individual controlled the system of wires at the time of the accident who, before action begun therefor, transferred all his interests to a successor company; where a person defectively constructed a plant and sold it to a second person in its defective condition, as a consequence of which faulty construction injury occurred after the transfer; where a dangerous system was operated without injury to anyone up to the time of its sale to transferees who became aware of its dangerous features in time to prevent the injury that eventually results.

A case of the first is that of Gordon vs. Ashley (79 N. Y. Supp. 274) in which the defendant built and operated for a time a plant to furnish electric light to a town in the State of New York. This plant was then sold by the defendant to a company in which he held a controlling interest. After this sale a pedestrian was killed by a wire that had been defectively maintained. The court held the company responsible and excused Ashley, the defendant, although it appeared that permission had never been given by the municipality authorizing the transfer of the franchise from Ashley to the company.

Interesting cases have arisen over liabilities for defective wiring attaching to companies who have succeeded to the properties and interests of former owners. It is easy to understand that the constructing owner may maintain unsafe appliances for a considerable length of time without any accident having occurred, and, having sold them, injury results to some one directly as a result of defects known and maintained by the previous owner and not yet known to the purchaser. Or, perhaps, the purchaser may have learned of the defects in the appliances but not within such time as permitted of repairs. The law has been determined in such cases, and the liability for injuries resulting from such defective maintenance is justly imposed upon him who was at fault. Scheiber vs. United Tel. Co. (153 Ind. 609) well illustrates this point. Action was begun against a telephone company by the owner of a house for injuries sustained from the conduction of lightning into he house by the telephone wires of the company. The wires were originally placed in the building by a company whose properties and interests became those of the defendant. The telephone was removed, leaving the wires dangling on the outer walls of the house in an uninsulated condition. Lightning was conducted by these wires into the cellar of the building after it became the property of defendant and the plaintiff suffered a shock. The court here reasoned, Baker (J.), "Accepting this for present purposes, as a sufficient charge that appellee, at and before the time of the accident, owned and operated the plant, no inference arises (if inference could be accepted in lieu of facts in pleadings) that appellee had any opportunity to put the wires in proper condition before the accident occurred. The fact that appellee became responsible for the condition of the wires only the instant before the accident happened would accord with all the facts stated in the complaint. In actions based upon failure to repair, and the like, it is fundamental that the complaint must show that the duty rests upon the defendant, and that the defendant has had a reasonable opportunity to discharge that duty." In other words the court concluded that no cause of action was here shown against the successor company, it appearing that the "defect was occasioned by the removal of a telephone belonging to another corporation of which the defendant is the successor, and it is not shown that the defendant created the dangerous condition or had the opportunity to put the wires in proper condition before the accident."

Waller vs. Leavenworth Light etc. Co., (9 Kan. App. 301), expresses the responsibility assumed by an electric company succeeding to the properties of another. "When one electric light company purchases the plant of another company and continues its business, it impliedly contracts with its customers and the public that it will use such appliances and care as are known to the business to protect them from injury; and it is answerable to anyone who, without fault on his part, sustains damages from its failure to do so."

EFFECT OF PRESERVATIVE TREATMENT ON STRENGTH OF TIMBER.*

The question is frequently asked whether or not the strength of timber is impaired by the processes in common use for wood preservation. No general answer to this can be given, since it depends altogether upon the character and strength of the preservative and the care with which it is injected. It is probable that creosote does not penetrate the wood fibers, but merely forms an external coating around them; hence, in itself, it can not appreciably affect the strength of the timber. In general the ultimate strength of treated timber depends, first, upon the percentage of moisture remaining in the wood; and, second, upon whether or not the wood has been subjected to injuriously high temperatures during the preliminary processes of steaming and vacuum, if these processes were employed. The degree of temperature which can be applied without risk of serious injury depends upon the duration of the temperature, the moisture content and quality of the wood, and upon the pressure to which it is subjected.

If proper care is observed in the treatment of the timber all danger of injury from excessive temperatures can be avoided. The amount of moisture remaining in the wood is, therefore, a point of greater importance. As the moisture in a piece of wood is reduced by drying, the strength of the wood increases, and as moisture is subsequently reabsorbed, the strength up to a certain limit is again reduced. Creosote retards both the

* Extract from Circular 139 of the Forest Service.

absorption and evaporation of water; hence its presence in thoroughly seasoned wood exposed to humid conditions tends to conserve its strength, whereas, on the other hand, if it is applied to green wood the strengthening action of water-evaporation is retarded. Some processes tend to increase the moisture content of the wood, and others to diminish it. Therefore, whether the strength of timber is increased or decreased during creosoting depends chiefly upon the process employed.

The effect which live steam at safe temperatures has upon the moisture content of wood is now being made the subject of a special study. It is safe to say, however, that during steaming the amount of moisture in air-dry timber is increased, with a consequent decrease in strength, and that the succeeding vacuum fails to remove all of the added moisture before the introduction of the preservative. With many kinds of air-dry timber, however, the steaming can be dispensed with altogether, and this is done in many commercial plants. Whether or not it can be omitted with all kinds of wood is not yet certain.

These considerations, of course, do not apply to the open-tank method, or to similar processes where the timber is immersed directly in the hot preservative, without the preliminary steaming and vacuum. Immersion in hot oil tends to evaporate some of the moisture in the wood and so to increase its strength.

Zinc chlorid and the other preservatives which are in water solution have a wholly different effect. Unless the wood structure is already filled with moisture to the point of saturation, more water is injected into it with the preservative, with the result, if the wood is partially seasoned, of decreasing its strength. The original strength may be regained, however, by seasoning. If the zinc chlorid is injected into the timber in too concentrated a solution it may cause a chemical dissolution of portions of the wood fiber, with the result of permanently decreasing the strength of the timber. But for the solutions in common use this danger need not be taken into consideration.

Both creosote and zinc chlorid are excellent antiseptics, and both can be obtained in large quantities. Creosote's principal point of superiority, however, lies in its insolubility in water. Hence, once it is injected into timber it will not wash out, no matter how wet may be the situation in which the treated timber is placed. On the other hand, zinc chlorid is much cheaper than creosote, and since it is shipped in the form of a solid the freight charges are considerably less than they would be for enough creosote to treat the same amount of timber. But zinc chlorid is soluble in water, being in fact injected into the timber in water solution, and so when timber treated with zinc chlorid is exposed to moisture the leaching out of the salt is only a question of time. Hence, zinc chlorid is most commonly used in comparatively dry situations. Creosote, on the other hand, is used where the timber will be subjected to moisture. Moreover, creosote is one of the very few preservativs withiin commercial reach which offer absolute protection against the marine borers, which work such havoc among the wharves of the Atlantic, Gulf, and Pacific Coasts. Since it is insoluble in water it can not wash out of the piles into which it has been properly injected, and since it is more than a mere external coating there is no danger of its being broken off by floating debris.

Processes have been developed which involve the compression and expansion of the air in the wood structure to expel some of the expensive creosote, leaving only a film among the cell walls. The amount of oil left in the timber is reduced, and in consequence the cost of the treatment as well. In other cases zinc chlorid and creosote are mixed together and injected into the timber in the form of an emulsion, the object being to reduce the cost of the treatment and to prevent the zinc chlorid from leaching out of the timber. Sometimes the timber is impregnated with zinc chlorid, and only a narrow outer layer is filled with creosote; or again, glue and tannin are employed in the effort to plug up the outer wood cells and so keep the salt in the interior.

The Saving in Dollars and Cents.

No process to preserve timber can come into use unless it is certain that the outlay for the treatment will be more than offset by the longer service of the treated timber. It is difficult to give a general example of the saving effected by treating certain timbers with preservatives, since it depends so largely upon local conditions and the class of timber. The following examples of the saving which under certain circumstances can be effected by proper preservative treatment are, however, typical, although they may not apply to other localities and to other kinds of timber without some modification:

An untreated loblolly pine fence post costs about 8 cents, or, including the cost of setting, 14 cents. Its length of life in this condition is about two years. Compounding interest at 5 per cent, the annual charge on such a post is 7.53 cents—that is, it costs 7.53 cents a year to keep such a post in service. If given a preservative treatment, which costs about 10 cents, the length of life of the post is increased to about eighteen years. The total cost of such a post, set, is then 24 cents, which, compounded at the above interest rate, gives an annual charge of 2.04 cents. Thus the saving due to treatment is 5.49 cents a year. Assuming that there are 200 posts per mile, there is a saving each year for every mile of fence of a sum equivalent to the interest on $219.60.

The saving due to treating railroad ties is also worthy of consideration. A loblolly pine tie untreated is worth about 30 cents, and its length of life in this condition is about five years. To this first cost should be added the cost of laying, which is about 20 cents. The annual charge figured as above is then 11.52 cents. If treated it will last for about twelve years. Its cost of treatment is about 35 cents. A treated tie in the track, therefore, costs about 85 cents. Compounded at 5 per cent, as in the above example, its annual charge is 9.48 cents. The saving per year is therefore 2.04 cents per tie. Assuming 2,880 ties per mile of track, the saving due to treatment alone amounts to $58.75 per mile, which corresponds to an investment of $1,175 per mile.

Assuming that the cost of an untreated oldfield or loblolly pine pole, including hauling and setting, is $5, and that it lasts five years—a fair estimate for many portions of the United States—the annual charge, compounding interest at 5 per cent, amounts to $1.15. In other words, it costs the owner $1.15 a year for every such pole in his lines. This corresponds to a capital of $23 invested at 5 per cent interest, or, for a mile of 40 poles, to $920. Again, assuming that the butt of such a pole can be treated for $1, the first cost of the pole, set in the ground, is $6. The treatment may reasonably be expected to secure a service from the pole of twenty years, instead of five years when untreated. Thus, the annual charge on the treated pole, with the same rate of compound interest, is only $0.48 per pole, which corresponds to an investment of $9.60; or $384 per mile, as compared with the $920 per mile in the other case. Thus during the life of the treated pole a yearly saving of the interest on $536 will be effected for every mile of line.

It might be said that it is not positively proved that the treated poles will last twenty years, and that it will be necessary to wait until the poles are finally removed before the length of their service can be determined. A sufficient answer to this argument is that treated poles need to last only 1.6 years longer than untreated poles in order to justify the cost of treatment. Moreover, there is abundant evidence to show the long life of creosoted wood. Even in this country there are many examples of poles and other timbers creosoted twenty and even thirty years ago, which today are apparently as sound as when first set in the ground. In Europe, where wood preservation is an older industry, the results are still more marked. There have been failures, but in every instance they can be traced to incompetent or fraudulent work, insufficient impregnation, improper preparation of the timber, or some similar cause.

APPROVED ELECTRICAL DEVICES

CABINETS.

Cast-iron boxes for combination plug fuse cut-outs and knife switches for service entrance work. Cat. Nos. 358, 359, 360. For open work, Cat. Nos. 378, 379, 380, for rigid conduit. Approved Oct. 5, 1908. Manufactured by

Bryant Electric Co., Bridgeport, Conn.

CONDUIT BOXES.

"Pipe Taplets." Cast-iron outlet boxes, with threaded openings for standard sizes of rigid conduit. For use with special porcelain covers, or with suitable approved rosettes or receptacles. Approved Oct. 12, 1908, for exposed work only. Manufactured by

H. T. Paiste Co., 32d and Arch Sts., Philadelphia, Pa.

CONDUIT, UNLINED.

"Harveyduct" and "Interiorduct" approved labels. Unlined conduit shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined and tested at factories under the supervision of the Underwriters' Laboratories, Inc., have labels attached to each length. This company is equipped to supply this conduit so labeled. Approved Oct. 1, 1908. Manufactured by

Western Conduit & Mfg. Co., 1110 Tacoma Bldg., Chicago, Ill.

FLEXIBLE CORD, PORTABLE (for Electric Heaters).

Cat. Nos. 5,560, 5,584 and 5,585. Flush wall type, Cat. Nos. 5,415-5,418, inclusive; 5,443-5,446, inclusive; and "Polarity," Cat. No. 5,565. Floor box type, Cat. Nos. 5,506-5,508, inclusive.

Double or triple braided; conductors with rubber and asbestos coverings. Types having single protection braid over both conductors, having braid on each conductor, with outer braid over all. Tag on coil to read, "Nat'l Elec. Code Standard." Marking: Red thread cabled with copper strands. Approved Oct. 12, 1908. Manufactured by

John A. Roebling's Sons Co., Trenton, N. J.

RECEPTACLES FOR ATTACHMENT PLUGS.

10 A., 250 V. Surface cleat type, Cat. Nos. 5,512-5,514, inclusive. Concealed type, Cat. Nos. 5,426-5,428, inclusive. Moulding type, Cat. Nos. 5,540-5,542, inclusive. And Fielding, Approved Sept. 30, 1908. Manufactured by

Harvey Hubbell, Inc., 35 Organ St., Bridgeport, Conn.

RECEPTACLES FOR ATTACHMENT PLUG.

"M. & M." Flush receptacle with flush plug, 10 A., 250 V., Cat. No. 2,041. Flush receptacle, Edison type, 3 A., 250 V., Cat. No. 4,354, for use with approved Edison attachment plugs. Approved Oct. 6, 1908. Manufactured by

Machen & Mayer Elec. Mfg. Co., 12th and Buttonwood Sts., Philadelphia, Pa.

RECEPTACLES, STANDARD.

"Perkins" brass shell wall sockets. Key, 50 C. P., 250 V. Keyless, 3 A., 250 V., Cat. Nos. 9,184-P and 9,185-P. Wall sockets mounted on Thomas link fuse rosette bases, cleat and concealed types, 2 A., 125 V. Cat. Nos. 24,990, 24,991, 24,993 and 24,994. Also all of the above types with shade holders attached. Approved Aug. 18, 1908. Manufactured by

Perkins Electric Switch Mfg. Co., Bridgeport, Conn.

SOCKETS, STANDARD.

Weber brass shell, key and keyless. Cat. Nos. 61,372, 61,375, inclusive, 61,573 and 61,575. Pendant types, Cat. Nos. 61,773 and 61,775. Approved Aug. 20, 1908. Manufactured by

Weber Electric Co., Schenectady, N. Y.

"Bryant" brass shell. Key, 50 C. P., 250 V. Keyless, 3 A., 250 V. Cat. Nos. 9386, 9392, 50760, 50768, 99386, 99392, 43389, 43390. Fixture sockets 1317 to 1320, inclusive. "Security Snap," Nos. 44147 to 44152, inclusive, and 44814, 44815. "New Wrinkle," Nos. 59480 to 59487, inclusive. Twin sockets, Cat. Nos. 46750 to 46752, inclusive, for use on fixtures only. Also above types with shade holders attached. Approved Aug. 18, 1908. Manufactured by

Bryant Electric Co., Bridgeport, Conn.

SOCKETS, WEATHERPROOF.

Pendant composition sockets. "Moulded mica" and "black compound," 3 A., 250 V., Cat. No. 1,140 and 1,149. Approved Sept. 30, 1908. Manufactured by

Johns-Pratt Co., Hartford, Conn.

H. W. Johns-Manville Co., 100 William St., New York, Sole Agents.

G. E., 3 A., 250 V., Edison type, moulded composition. Pendant style, Cat. Nos. 60,666 and 43,310. Bracket types, Cat. Nos. 43,311-43,314, inclusive. Approved Aug. 20, 1908. Manufactured by

General Electric Co., Schenectady, N. Y.

SWITCHES, AUTOMATIC.

G. E. For remote control, rated 30 A., 110-220 V., D. C. A triple pole, double break knife switch, with blade carrier actuated by solenoids in an auxiliary circuit; designed to be installed in a vertical position. Approved Oct. 5, 1908. Manufactured by

General Electric Co., Schenectady, N. Y.

SWITCH BOXES.

"Burns" water and gas tight, cast iron switch box for mounting snap switches. Cat. Nos. 65-68, inclusive. Approved Aug. 11, 1908. Manufactured by

J. F. Burns, 47 N. Hutchinson St., Philadelphia, Pa.

SWITCHES, COMBINATION CUT-OUT.

"Heineman" service entrance switches, 30 A., 250 V. Porcelain base knife switches with holders for Edison plug fuses. Cat. Nos. 211 and 221, double and three pole type. Approved Sept. 30, 1908. Manufactured by

Geo. Heineman & Co., 500 Girard Ave., Philadelphia, Pa.

SWITCHES, KNIFE.

Type V, Baby Knife Switches, all styles, 15 and 25 A., 125 and 250 V. Panel switches, 15 A., 125 V., with or without extensions for open or cartridge enclosed fuse. Cat. Nos. 361, 362 and 350. Approved Sept. 30, 1908. Manufactured by

Bryant Electric Co., Bridgeport, Conn.

Panel-board switch, 10 A., 125 V. Approved Aug. 11, 1908. Manufactured by

Leonard-Bundy Elec. Co., Cleveland, Ohio.

"Krantz" Switches, Types H and HK. All capacities and styles, 125 or 250 V., Type P. C. 0-100 A., 250 V. Approved Oct. 2, 1908. Manufactured by

A. Krantz Mfg. Co., 160-166 Seventh St., Brooklyn, N. Y.

Type A, all capacites, 250 and 600 V. Type C, 0-100 A., 250 and 600 V. Panel-board switches, 10 A., 125 V. Approved Oct. 12, 1908. Manufactured by

Leonard-Bundy Elec. Co., Cleveland, O.

SWITCHES, PUSH-BUTTON FLUSH.

"M. & M. Shallowest." Single-pole and three-way, 10 A., 5 A., 250 V., Cat. Nos. 2,000 and 2,002. Double-pole, 10 A., 250 V., Cat. No. 2,001. Also above types with lock attachment. Approved Aug. 31, 1908. Manufactured by

Machen & Mayer Elec. Mfg. Co., 12th and Buttonwood Sts., Philadelphia, Pa.

Porcelain shell, keyless, 3 A., 250 V. Cleat type, No. 50,715. Concealed type, No. 51,717. Approved Oct. 7, 1908 Manufactured by

General Electric Co., Schenectady, N. Y.

CABINETS.

"C. H. Co." wooden panelboard cabinets, steel or slate lined; doors with or without glass panel. Steel panelboard cabinets, with and without slate gutter, wood or steel trim; doors with or without glass panel. Approved July 21, 1908. Manufactured by

Crouse-Hinds Co., Syracuse, N. Y.

"Burns" cast-iron cabinets for mounting service entrance switches. Cat. Nos. 410, 415, and 420. Approved August 11, 1908. Manufactured by

J. F. Burns, 47 N. Hutchinson St., Philadelphia, Pa.

CONDUIT BOXES.

Universal pressed steel boxes, types 300-S, 320-S, 99-S, 9-S, 7-S, 77-S, 4-S, and 5-S, with covers for all types. Also "Dead Ground" cast boxes for use with armored cable. Approved July 30, 1908. Manufactured by

Thomas & Betts Co., 299 Broadway, New York.

FIXTURES.

"Wooden fixtures," with all interior wiring in metal ducts. Ceiling, bracket and portable types. Approved July 21, 1908. Manufactured by

A. T. Fischer Co., Park Building, Cleveland, Ohio.

FLEXIBLE CORD, PENDANT.

Tag on coil to read, "Nat'l Elec. Code Standard." Marking: Ridge on rubber insulation. Approved labels. Cords made in accordance with the latest specifications of the National Board of Fire Underwriters and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each coil, like sample on this card. This company is equipped to supply this cord so labeled. Users and underwriters having jurisdiction are advised to give preference to cords which bear these labels. Approved July 1, 1908. Manufactured by

Okonite Company, Ltd., 253 Broadway, New York.

HANGERBOARDS, ARC LAMP.

G. E. Cat. No. 36850, with ceiling switch and Edison plug fuse cutout, for arc lamps requiring not more than 5 A., 250 V., 10 A., 125 V. Approved July 21, 1908. Manufactured by

General Electric Co., Schenectady, N. Y.

INSULATING SUPPORTS.

Insulating ceiling hook, "Why," Cat. No. 408, for arc lamps and small motors. Approved July 21, 1908. Manufactured by

Geo. Cutter Co., South Bend, Ind.

LAMP GUARD.

"Benjamin," for 16 C. P. lamps. Cat. No. 160P. Portable guard, wooden handle with fibre cage, for use only in dry places. Cat. No. 160. Metal lamp guard. Approved July 21, 1908. Manufactured by

Benjamin Elec. Mfg. Co., 42 W. Jackson Blvd., Chicago, Ill.

PANELBOARDS.

"Crouse-Hinds" panelboards, for two or three wire, 125, 125-250, and 250 volts, with or without main line knife switches and cutouts. With Edison plug or cartridge enclosed fuse cutouts and knife switches in branch circuits. Approved July 30, 1908. Manufactured by

Crouse-Hinds Co., Syracuse, N. Y.

RECEPTACLE FOR ATTACHMENT PLUGS.

Kliegl automobile charging pockets and flush wall pockets. Cat. Nos. 305, 310 and 311, 50 A., 125 V., and Cat. No. 315, 100 A., 125 V. Approved July 30, 1908. Manufactured by

Universal Electric Stage Lighting Co. (Kliegl Bros., Props.), 1393-1395 Broadway, New York.

RECEPTACLES, STANDARD.

"P. & S." wall sockets, 3 A., 250 V. (keyless), and 50 C. P., 250 V. (key). Brass shell, Cat. Nos. 387, 0387, 455, 456, and 61066 to 61068 inclusive, with metal keys. Porcelain shell, Cat. Nos. 2371, 02371, 237, 0237, 247, 0247, 1087, 107. Approved July 21, 1908. Manufactured by

Pass & Seymour, Inc., Solvay, N. Y.

SIGNS, ELECTRIC, ALL-METAL SIGNS.

"Reflex" "Solid Background Letter," "Skeleton Electric Letter Roof," and "Enameled Unit Letter" types. Approved Aug. 20, 1908. Manufactured by

A. & W. Elec. Sign Co., Prospect and W. 3d St., Cleveland, O.

SOCKETS, STANDARD.

G. E. "Multi-catch," Cat. Nos. 59,952-59,959, inclusive. Approved Oct. 7, 1908. Manufactured by

General Electric Co., Schenectady, N. Y.

SWITCH BOXES.

"H. & H." switch boxes for knob and tube work. "H. & H." wall case for door switch, for conduit or knob and tube work. Approved July 16, 1908. Manufactured by

Hart & Hegeman Mfg. Co., 342 Capitol Ave., Hartford, Conn.

SWITCHES, PENDANT SNAP.

"C.-H." switches, 6 A., 125 V., 2 A., 250 V. All porcelain for pendant use. Cat. No. 7000. Brass cap for pendants or fixtures. Cat. Nos. 7001 and 7002. Approved July 21, 1908. Manufactured by

Cutler-Hammer Mfg. Co., 12th St. and St. Paul Ave., Milwaukee, Wis.

P. & S. pendant switch. Cat. No. 3000, 3 A., 250 V., 6 A., 125 V. Approved July 21, 1908. Manufactured by

Pass & Seymour, Inc., Solvay, N. Y.

SWITCHES, SURFACE SNAP.

C.-H." surface push button switch, single pole, 6 A., 125 V., 2 A., 250 V. Cat. Nos. 7100 and 7101, for moulding work. Cat. Nos. 7102 and 7103, for concealed work. Approved July 21, 1908. Manufactured by

Cutler-Hammer Mfg. Co., 12th St. and St. Paul Ave., Milwaukee, Wis.

G. E. single pole ceiling switches. Cat. Nos. 47092 and 47093, 5 A., 250 V., 10 A., 125 V. Approved July 21, 1908. Manufactured by

General Electric Co., Schenectady, N. Y.

SWITCHES, SURFACE SNAP, SUB-BASES.

All porcelain sub-bases, for use with C.-H. surface push button switch in moulding work, exposed or concealed wiring. Cat. Nos. 7180, 7181, 7182. Approved July 21, 1908. Manufactured by

Cutler-Hammer Mfg. Co., 12th St. and St. Paul Ave., Milwaukee, Wis.

SOCKETS, STANDARD.

"C.-H." all porcelain push button socket, 50 C. P., 250 V. Cat. No. 7400. Approved for pendant use only in places where they will not be exposed to ard usage, July 21, 1908. Manufactured by

Cutler-Hammer Mfg. Co., 12th St. and St. Paul Ave., Milwaukee, Wis.

Brass shell, key and keyless sockets, with or without shade holders. Edison type, key, Cat. Nos. 9386, 1317, 50760, 43389, 1318, 99386, and Electrolier Cat. Nos. 29623 and 29624; keyless Cat. Nos. 9392, 1319, 50768, 43390, 1320, and 99392; T. H. types, key Cat. Nos. 50713 and 50761; keyless Cat. Nos. 50714 and 50769. Approved July 21, 1908. Manufactured by

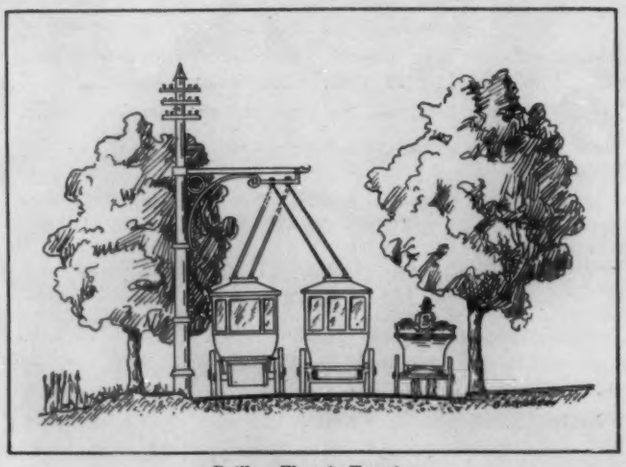
General Electric Co., Schenectady, N. Y.

RAILLESS ELECTRIC TRACTION.

By Bruno Heymann.*

Problems of transportation have been of absorbing interest to the public since the days of the old stage-coach; and with the introduction of steam and electricity as motive power, technical and commercial minds have striven to obtain a practical combination of maximum capacity and minimum expense. One of the most recent solutions of the problem is railless electric traction.

The system was originated and first developed in Germany, where quite a number of lines are now in use, but proofs of its successful operation have also been given in other European countries and in the United States. The first installations were made in 1901, and each succeeding year has seen the installations increasing in number and importance. It is said that the Italian Government is considering the adoption of the system upon a large scale, for general transportation upon the public highways.



Railless Electric Traction

The principal feature of this new system is a guidable car, driven directly upon the street or country road, without rails. Two trolley wires, strung above the street, supply the power—one feeding the motor, the other returning the current, thus completing the electric circuit. The trolley-pole allows the car a lateral freedom of motion in either direction, similar to that of an automobile, and sufficient to allow it to pass another car or any obstacle easily, as is shown in the accompanying illustration.

A large field of commercial possibilities is open for this system, as it handles both freight and passenger traffic, and the cost of installation is low.

Small cities and country places lacking railroad connections are directly benefited by this system of railless traction, for the heavy cost of construction, the purchase of right-of-way, and the numberless other expenses of railway building, are dispensed with, and the problem of bringing the smaller and more isolated places into closer commercial communication is satisfactorily solved. Industrial plants, as well as mines, quarries, brick and lumber yards, etc., can benefit by the advantages which this system offers against the horse or mule team or the traction engine.

A smooth, hard road, kept in good general condition, is all that is necessary for the faultless and uninterrupted operation of this system. Freight may be handled by electric trains, the cars being fitted with a coupling and steering device, which keeps them in the exact path of the electric locomotive. Tests have proved that the cars can easily be operated on a grade of eight per cent and still higher, with an equipment of suitable brakes. The average speed on the level is fourteen to fifteen miles per hour.

The cost of repairs for the cars is small, the bearings being ball bearings and the motors, standard street railway motors, the utility of which has long since been proved. The other electrical equipment requires very little repair, and is almost identical with that of the regular electric street railway.

The current for operation is direct current of 500 volts or more. It is a fact that the amount of current required is dependent upon the condition of the road, but actual operation has proved that the power consumed for a fairly well-kept road is smaller than for an electric railway.

The plant furnishing the power to such a system would increase considerably its efficiency, due to a more constant utilizing of its machines, the majority of which are installed to meet a peak load, usually occurring during a few hours of the day.

The most recent installation is that of Muehlhaussen, Germany, where the railless electric traction was chosen by a committee after careful consideration of the merits of other competing systems. The following digest of estimates was given by Mr. Douglas Fox, M.A., in a paper read before the British Association, in Dublin, September 9, 1908.

	Gasoline Bus.	Railless Elec. Traction.	Electric Railway.
Total cost of route (6¾ miles)	$117,000	$124,500	$310,000
Total cost per mile.	17,350	18,450	45,900
Expenses per car-mile, including repairs, renewals, depreciation, and 4% interest	0.196	0.107	0.151

Every system has its own sphere, and progress demands the adoption of that system which affords the greatest efficiency for the least amount of expended capital. Railless electric traction is well worth attention, and with the present stimulated interest in good roads, its success seems assured in a country of progressive commercial enterprise.

* Instructor in Mechanical Drawing, the California School of Mechanical Arts.

INACESSIBLE ECONOMIZERS.

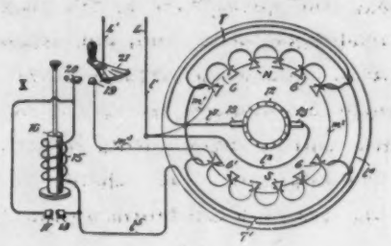
When the rapid increase in a factory's requirements for steam far exceed those anticipated at the time the boiler plant was laid out, the installation of economizers is often the best remedy. In such instances an economizer must usually be placed with secondary regard to ease of access and cleaning. But what excuse can a consulting engineer offer for placing an economizer between the boiler-house wall and the by-pass flue in such a way that repairs or cleaning is practically impossible, particularly in a new plant where the value of land is of very little importance.

In a specific case where this was done, the choking of the draft through the dirty economizers made it absolutely necessary that the by-pass damper should be partly opened even with a light load. The designer of the plant explained that a higher volatile coal was being burned than that for which the plant was designed, and that as a consequence the economizer could not handle all the gases because of the resulting increase in volume. But an analysis of the coal by the Coal Department of the Arthur D. Little Laboratory, Boston, showed that the coal being burned actually contained two per cent less volatile than the coal originally designated. Under this condition the economizer was increasing the efficiency by less than three per cent.

PATENTS

SINGLE-PHASE COMMUTATOR-MOTOR. 902,720. George W. Euker, Boston, Mass., assignor to Diehl Manufacturing Company, a corporation of New Jersey. Filed Aug. 20, 1907. Serial No. 389,384.

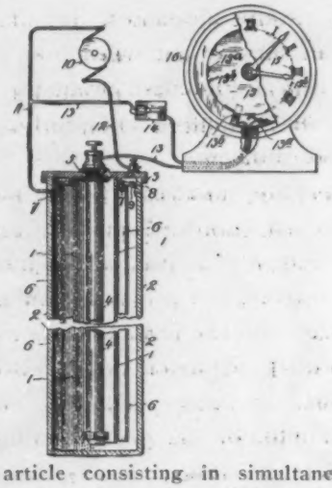
In a single phase commutator motor, an armature having discs or laminations, each comprising a complete ring with one radial slot, and a shaft having a non-circular out-



line in one side only, said shaft having a co-operating engagement with said laminations at its non-circular portion to prevent their independent rotation, said portion being located substantially diametrically opposite the slots of the laminations, whereby the turning forces on the laminations are received at the points of their greatest strength.

METHOD OF AND APPARATUS FOR ELECTRO-PLATING. 902,892. George A. Lutz, Plainfield, N. J., assignor to American Circular Loom Company, Portland, Me., a corporation of Maine. Filed June 27, 1908. Serial No. 440,774.

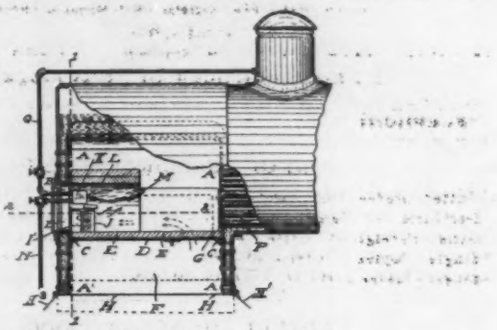
The method of electro-plating the interior and exterior



of a hollow article consisting in simultaneously passing electric current through anodes within and without such article and causing the current to flow for a longer period of time through one of the anodes than through the other anode.

INTERNALLY-FIRED BOILER. 902,893. Thomas C. Mason, Los Angeles, Cal., assignor, by direct and mesne assignments, to Mason Smokeless Combustion Company, Incorporated. Filed May 6, 1907. Serial No. 372,282.

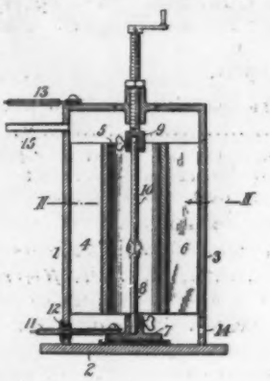
As an oil burning apparatus, an internally fired boiler, a partition in the fire box thereof dividing the same into an air chamber below, and a combustion chamber above said partition, a damper at the bottom of the air chamber, horizontal flues at each side of the combustion chamber, the partition having apertures connecting one end of the flues with the air chamber, two partly spaced arches at one end of the combustion chamber, the other end of the flues communicating with the space between the arches, a burner located in the combustion chamber under the arches, and



a transverse flue connected at each end with the space between the arches and having an outlet beneath the burner whereby heated air is discharged beneath the flame from the burner.

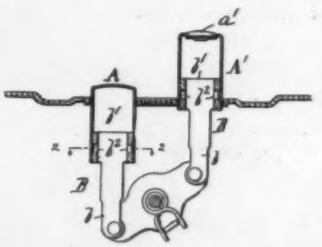
METHOD FOR PRODUCING NITRIC OXID. 902,607. Isaiah L. Roberts, New York, N. Y. Filed February 20, 1907. Serial No. 358,377.

The method of producing nitric oxid, which consists in continuously supplying a mixture of nitrogen and oxygen to



the lower end of a tubular passage, maintaining in said passage a flaming electric arc containing chromium, and conducting off the resulting product from the upper end of the passage, as set forth.

PUSH-BUTTON FOR ELECTRIC SWITCHES. 902,962. Gilbert W. Goodridge, Bridgeport, Conn., assignor to The Perkins Electric Switch Manufacturing Company, Bridgeport, Conn., a corporation of Connecticut. Filed July 24, 1908. Serial No. 445,286.



A push button for electric switches, comprising a sheet metal button head in combination with a stem having a head formed of arms bent into a split tube with openings into which the metal of the button head is indented.

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POWER AND GAS

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FOUNDED 1897 AS THE
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The Electric Smelting of Iron

Once again we take pleasure in presenting data on the electric smelting of iron. According to Mr. C. F. ELWELL's figures in this issue, twenty-one tons of pig iron were produced at the latest run of the Noble Electric Steel Company's electric furnace in Shasta County, California, with an average expenditure of one-fourth of a kilowatt year per ton. As power costs the company $16.00 per kilowatt year, this gives $4.00 as the cost of electricity to smelt one ton of iron, and places the estimated cost of production slightly lower than the selling price in the Eastern market. These figures were obtained with an experimental furnace consuming about 150 kilowatts, and should at least be equaled in the 1,500-kilowatt furnace now being constructed.

It is as yet too soon to indulge in optimistic prophecy. There is good ground, however, for the hope that long before our coal resources are exhausted electric heat will be used in iron smelting in certain localities. While the idea of producing iron or steel in an electric furnace is not particularly new, yet the production of the metal by electricity more cheaply than it can be done by blast furnaces in the same locality is noteworthy. When ample water power can be cheaply developed in the immediate neighborhood of the ore and when fuel is dear, pig iron and steel can be produced profitably in an electric furnace. Thus, locality is found to be the governing factor in this problem.

Electric smelting produces a better iron, as there is no contamination from the impurities usually found in coke. The quantity of heat is not always so important as the quality, just as quality and not quantity is often the main requisite in food. Electric heat may be more accurately regulated and adjusted for uniform production. It seems an anomalous condition, in which fuel, hitherto the greatest problem in the cheap production of electric power, can be replaced by electricity, and furthermore, that iron, whose magnetic properties make it indispensable in generating electric current, is itself to be produced electrically.

This is a question of peculiar interest to the Pacific Coast, which has large deposits of high grade iron ore. Heretofore the high price of coke has prevented their development, but now where coal is lacking, electricity developed by cheaper power can take its place. The process promises an ample supply of iron for manufacturing purposes, and also offers a large field for the consumption of hydro-electric power.

PERSONAL.

H. V. Carter, of the Pacific Electric Works, of Los Angeles, was in San Francisco this week.

T. E. Burger, of the California Electric Co. of Los Angeles, was in San Francisco this week.

E. S. Fobes, of the Fobes Supply Co., of Seattle, Wash., has returned home after a brief visit to San Francisco.

M. M. O'Shaughnessy, of San Francisco, is making a short trip South, in connection with some hydraulic work.

Robert Howes is superintendent of construction for the Chilliwac branch of the British Columbia Electric Street Railroad Co., of Vancouver.

F. F. Skeel, representing the Crouse-Hinds Electrical Company, has been in Seattle this week, and is expected in San Francisco during the next few days.

OBITUARY.

James Goodwin, for ten years president of the Bakersfield Power, Transit & Light Co., died at Bakersfield, Cal., on November 15, 1908.

MEETING NOTICES.

The Los Angeles Section of the American Institute of Electrical Engineers met November 17, 1908, at the University of Southern California. Edward Y. Porter read a paper on "Notes on the Calculation of Illuminating Values." There was a general discussion among members, with special reference to the illumination of public thoroughfares.

TRADE CATALOGUE.

The Rauch & Lang electric vehicles are illustrated and described in a handsome catalogue from Rauch & Lang Carriage Company, of Cleveland, Ohio.

Bulletin No. 22, from the H. Krantz Mfg. Co., of Brooklyn, New York, lists Punched Clip Knife Switches. These are made in single, double, triple and four-pole. They are arranged with and without fuse terminals, and for any make of enclosed fuses.

Bulletin No. 11, from the Holophane Company, illustrates and describes three new types of Holophane tungsten reflectors. These are known as Extensive, Intensive, and Focusing, and are designed upon the new "equal press" principle.

In Bulletin No. 5532 from the Western Electric Company is described the Victor flaming arc lamp, which is the result of careful tests and intelligent development. The bulletin gives illustrations and descriptive matter relative to the various parts; also information as to the different applications to which the lamp is adapted, together with tables of dimensions, weights, and hours of life.

The Work of the Electrical Testing Laboratories is described in a paper by Wilson S. Howell read at the twenty-third annual meeting of the Association of Edison Illuminating Companies, held at Hot Springs, Va., September 10th, 11th, and 12th, 1907. This has been published for distribution by the Electrical Testing Laboratories, Eightieth Street and East End Avenue, New York, N. Y.

Crocker-Wheeler Bulletin No. 109, just issued, describes small generating sets consisting of Crocker-Wheeler generators and "Type D" engines made by the U. S. Rapid Fire Gun & Powder Co. These sets range from two to nineteen kilowatts, and are used to advantage for complete lighting plants for small hotels, apartment houses, etc.; for night lights operated on banked boilers after the main lighting plant has been shut down; for yachts, barges, dredges, wrecking steamers, etc.; for railroad stations and other detached buildings; for lifting magnets on locomotive cranes; for charging storage batteries for electric vehicles; and for innumerable other purposes. The engines operate with high economy, and their design is up-to-date in every respect. The design of the generators is described in Crocker-Wheeler Bulletin No. 100.

General alternating current information and formulas for calculating the voltage drop in any feeder, the size of generator and engine required for lighting and power plants, and a table of resistance and carrying capacity of wires, are given in Bulletin No. 107, recently issued by the Crocker Wheeler Company, of Ampere, N. J. The bulletin fully describes their line of direct-current lighting and power generators of large sizes, and contains a large number of illustrations, showing complete installations. These comprise office-building plants, central stations, a textile mill plant, and a number of various industrial plants.

BOOKS RECEIVED.

With the advent of scientific books on the principles of efficient lighting, illuminating engineering is being accorded the respect due it. Such a text is "Electrical Illuminating Engineering," by Wm. E. Barrows. While the treatment is nominally limited to electric lighting, yet from the comparative tables and from the fundamental principles of the art, may be derived a complete working knowledge of satisfactory light distribution. The chapters on photometry are especially good, as is also that on standards of illuminating power. Considerable space is devoted to the various types of incandescent, arc, and vapor lamps, and one chapter is devoted to shades and reflectors. The most valuable chapter is the concluding one, which contains a scientific analysis of illumination calculations. While there is little in the 200 pages of the book that has not been published elsewhere, the author has exercised judicious care in bringing pertinent information into small compass. The price is $2.00, and the McGraw Publishing Co., of New York City, are the publishers.

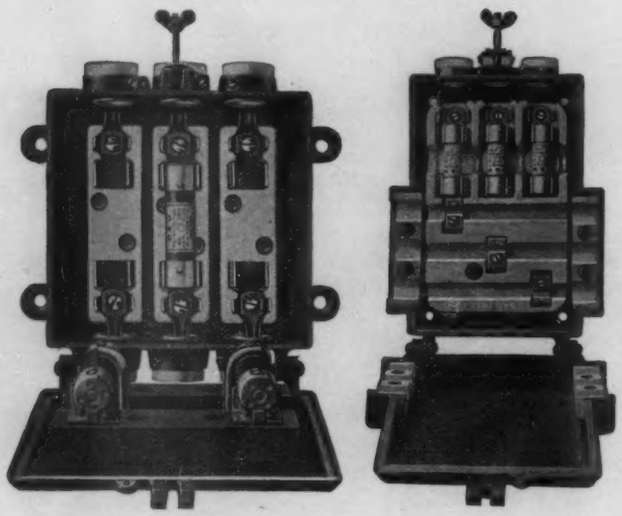
Of the various text-books on hydraulics, one of the most comprehensive yet issued is "Water Power Engineering," by Daniel W. Mead. This book deals with the theory, investigation and development of water power in all its phases. After an introductory chapter tracing the development of water-wheels from the earliest types to the most modern turbine, the author outlines the fundamental principles of power and of hydraulics. He next gives an extended treatment of all factors entering into the development of power from stream flow. On the knowledge of flow and head gained from hydrographs is based a method of estimating the power that can be developed for each day in the year and during each year for which hydrographs are available. In the chapters devoted to water-wheels are given detailed descriptions of most of the common types. After developing the theoretical formulas for turbines and describing practical methods of testing, some excellent suggestions are given for the selection of turbines. The chapters on regulation and governors are particularly replete with valuable information. The section on the selection of machinery and design of plant includes several examples of typical water-power plants, principles of dam and storage construction, and a complete treatment of the investigation of water-power projects. The book is well illustrated, and contains many valuable curves. The book is interestingly written, and contains much that is novel. As a guide for the study of a hydro-electric plant in its entirety, this volume is unequalled. It is published by the McGraw Publishing Co., of New York City, and sells for $6.00.

"Radio-Telegraphy," by C. F. Monckton, reviewed in our issue of November 14th, sells for $2.00, and is published by D. Van Nostrand & Co., of New York City.

INDUSTRIAL

D. & W. SERVICE SWITCHES AND BOXES.

The D. & W. Fuse Company are now placing upon the market their new service switches and boxes, which have materially improved their line. In the casting of the iron owing to operating their own foundry, they are able to produce boxes of high grade. Due to this higher grade material these boxes are lighter in weight than their former boxes with a smooth surface, thereby taking a finer finish when japanned. These boxes are provided with rubber gaskets



and removable porcelain bushings, through which the cable terminals may be readily passed. In the covers of the service switches are mounted the fuse guides to positively align the fuses in order that the boxes may be readily closed with the fuses properly engaging in the cut-outs. There are also mounted in these covers withdrawal hooks, which by one-quarter turn of the levers on the outside of the cover, remove the fuses at will.

Owing to the usual practice of grounding the neutral on a three-wire D. C. system, the box is so designed that the neutral fuse remains permanently in the box, thus avoiding any possibility of accidents due to the fuse being withdrawn. For multiphase circuits where all fuses should be removed, the box is provided with three hooks operated simultaneously by one lever.

The fuse boxes are similar in construction to the service switches, but are intended for use only as cut-outs, and therefore no switch mechanism is provided for in the covers, the fuses being directly mounted in the boxes.

In addition to these cut-outs they also have brought out a line of branch boxes in which particular attention is called to the split bushings mounted in the cover and boxes, which permit of the necessary connections without any break in the wiring, thereby greatly reducing the cost of installation. For both of these types of boxes they have designed a complete line of outlet hoods to be used in connection with a conduit system covering every possible requirement of connection, namely, straight-way, right or left hand and back and front. These hoods are firmly screwed to the

boxes, fitted with rubber gaskets if desired, and are interchangeable for any given type, being made to fit any size of conduit within the capacity of the box.

A COMPOUND FOR REPAIRING IRON AND STEEL.

Thousands of dollars are spent every year replacing machinery and parts, automobile cylinders, castings, radiators, boilers, fire pots, pipes and a thousand and one other things which have become useless because of cracks, spongy spots, sand holes or blow holes. It is not uncommon for defects in castings or cracks to make practically worthless pumps and other machinery costing $25,000, or more. There is hardly a factory of any size that does not contribute something to the scrap heap every year which could be saved were it possible to repair defects in iron and steel. This is now possible by the use of a product which the H. W. Johns-Manville Co., New York, is placing on the market under the name "Leak-No Metallic Compound."

Leak-No is a chemical compound resembling powdered iron. When mixed with water and applied like putty to defects in iron or steel articles, the manufacturers claim that it metallizes and becomes a permanent part of the article to which it is applied. In color it very much resembles iron, when hard. The manufacturers show their faith in this material by offering to refund the purchase price in case it fails to stop any ordinary leak in anything made of iron or steel against any pressure of oil, steam, gas, air, ammonia or water; and to stand any heat or chemicals that iron will stand, when applied according to directions. This certainly is a very liberal offer and one which enables anybody to test this material without expense, if it does not make good.

THE GAS APPLIANCE EXPOSITION.

The Exposition to be given in Chicago by the National Commercial Gas Association, with the co-operation of the American Gas Institute, from December 7 to 12, is developing into the most complete and comprehensive exhibit of gas appliance which has been seen in this country. The demand for space on the floor of the Exposition has been so great that but few remain. An examination for the list of applicants shows a great diversity, and from the present indications practically every appliance of importance to gas users and gas companies will be on display.

A contract has been closed by which the construction of booths and the decorations will be carried out with the utmost good taste. In the ten central sections of the Exposition Hall, exquisite Greek columns will mark each intersecting line, surmounted by a graceful, yet dignified, cornice. Each space will be marked off by a surrounding enclosure of railing running to suitable terminal posts. The four corners of each of the ten sections will be marked by an eight-inch Greek column surmounted by floral decorations. The platform will be five inches above the floor, and will be carpeted with green denim with a red border. The spaces under the galleries will each be marked by the same twelve-inch Greek columns which characterize the center of the Exposition Hall, and the wall back of the exhibit will be covered for seven feet with green burlap. The color scheme of the Exposition will be white and gold.

The plans for illumination are very elaborate, and it is doubtful if any Exposition Hall has ever been so well lighted as will be the First Regiment Armory during the Exposition. Plans are on foot for placing arc lights entirely around the armory, and for five blocks back into the city, so people attending the Exposition will have a pathway of light marked out for them, even from more remote car lines.

Arrangements are being made for a splendid band, which will play every evening.

One of the difficult problems which is being solved by the Exposition Committee, is that relating to the receipt and handling of exhibits, and the placing of these exhibits in the spaces secured by the exhibitors. Arrangements are also being made for the proper pipe connections. This remarkable service which has been undertaken by the committee for the exhibitor will relieve him of an enormous amount of detail, but the aggregate responsibility thrown upon the committee is not light. The management of this phase of the Exposition, is, however, being placed in the hands of excellent and experienced people, and will undoubtedly be performed with celerity and to the complete satisfaction of all those who send their goods for display.

The utmost care is being taken in the organization of the floor management. The importance of this is not so apparent to the outsider as it is to those very closely in touch with the subject. It is more than probable that 200,000 people will enter the armory during the six days of the Exposition. Even if half of this number should be in attendance, the necessity for properly handling the crowds and the management of the floor is paramount. Proper doormen will be provided. Plain clothes men will patrol the aisle. The city will send proper policemen and firemen. Arrangements will be made to control the doors, and adequate plans for the expert management of the gas supply will be provided.

The most elaborate plans have been made, and a contract entered into for the complete decoration of the interior of the Armory. These decorations will be most beautiful. In this connection it is interesting to note that the contract provided that all decorations shall be absolutely fireproofed. The stringent rules regarding the decoration of individual booths, which are made necessary by the nature of the exhibit, will be enforced, as the proper fireproofing of such decorations would be impossible, and further the decorations of the hall and the charming completeness of the sections themselves will be not only sufficient but as much as can properly be utilized from an artistic point of view.

Those who are considering the desirability of exhibiting are urged to put themselves immediately in touch with Mr. John C. D. Clark, Chairman Committee of Arrangements, 157 Michigan Avenue, Chicago. One feature of the Exposition, which should be clearly understood by all exhibitors who are not members of either the National Commercial Gas Association and the American Gas Institute, is this: The Gas Appliance Exposition is not promoted by outsiders, and is strictly an Exposition of gas appliance under the jurisdiction and complete control of a committee composed of the two Associations. The price charged per space is just enough to cover the expense of the Exposition, and the committee of the Associations is taking a very great burden and carrying it without compensation, for the benefit of the industry as a whole.

ANNUAL MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The twenty-ninth annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Socities Building, 29 West Thirty-ninth Street, New York City, December 1-4.

The papers to be read include the President's Address on "The Conservation Idea as Applied to the American Society of Mechanical Engineers," by M. L. Holman; "The Engineer and the People," by H. L. Cooke; "Aeronautics," by Major Geo. O. Squier; "Efficiency Tests of Milling Machines," by A. L. DeLeecuw; "Metal Cutting Tools Without Clearance," by James Harness; "Interchangeable Involute Gear Tooth Systems," by R. E. Flanders; "Durability of Gears in Electric Railway Service," by N. Litchfield; "Industrial Photography," by S. A. Hand; "Articulated Compound Locomotive," by C. J. Mellin; "Liquid Tachometers," by A. Trobridge; "Training Workmen," by H. L. Gantt; "An Averaging Instrument for Polar Diagrams," by Prof. W. F. Durand; "Salt Manufacture," by Geo. B. Willcox; "Reminiscences of a Gas Engine Designer," by L. H. Nash; "Possibilities of the Gasoline Turbine," by Prof. F. C. Wagner; "Physical Properties of Carbonic Acid and the Conditions of its Economic Storage for Transportation," by Prof. R. T. Stewart; "The Slipping Point of Rolled Boiler Tube Joints," by O. P. Hood and Prof. G. L. Christensen; "Tests on Friction Clutches for Power Transmission," by Prof. Richard G. Dukes.

ELECTRIC DRIVE FOR ORGAN FACTORY.

Another large manufacturing plant, that of the Estey Organ Company, in Brattleboro, Vt., is to install electric drive throughout the works. This is the largest organ factory in the world. They have just placed with the Crocker-Wheeler Company, of Ampere, New Jersey, an order for fifty-seven induction motors, ranging from ½ to 75 horsepower, together with seven transformers and a switchboard. Current will be purchased from the Connecticut River Power Company. Some of these motors will be used for driving individual machines and others for driving line shafting. The proper subdivision of the plant into groups and individual machines was a nice problem and was successfully worked out by the engineers of the Crocker-Wheeler Company.

NEWS NOTES

FINANCIAL.

BISBEE, ARIZ.—The Common Council has passed an ordinance calling for the issuing of bonds to the amount of $125,000 for the construction of waterworks.

ESCONDIDO, CAL.—The directors of the Mutual Water Company have adopted a resolution authorizing a loan of $30,000 by the company, for the installation of an electric light, heating and power plant, to be installed one-half mile below the company's reservoir.

NEWMAN, CAL.—The Board of Trustees of this place have finally passed a resolution calling for an election to vote on an issue of $30,000 in bonds, for the construction of waterworks.

SAN FRANCISCO, CAL.—At the recent election, the voters decided in favor of all three of the propositions submitted, looking toward the construction of the proposed Hetch-Hetchy municipal waterworks system. The first proposition authorized the Board of Supervisors to acquire the proposed system; the second, authorized an initial bond issue of $600,000; and the third authorized the purchase of the County Line Water Company's property at a cost of not more than $40,000.

SANTA CRUZ, CAL.—The City Council has passed through the first reading the initial resolution looking to the voting of bonds for a number of municipal improvements, including the reconstruction of the municipal electric lighting plant and system, the reconstruction of the municipal waterworks, and the reconstruction of the police and fire alarm system.

VISALIA, CAL.—The Devil's Den Consolidated Oil Company has levied an assessment of two cents per share on the capital stock of the company, delinquent November 17th.

LOS ANGELES, CAL.—The Encinal Oil Company has levied an assessment of one-quarter cent per share on the capital stock of the company, delinquent December 15th.

OAKLAND, CAL.—The Roosevelt Oil Company has levied an assessment of three cents per share on the capital stock of the company, delinquent November 30th.

INCORPORATIONS.

LOS ANGELES, CAL.—The Queen Oil Company has been incorporated here with a capital stock of $250,000, by W. M. Hamaker, H. Jackins, B. C. P. Smith, J. A. Dean, and J. H. Raney.

SAN FRANCISCO, CAL.—The B. A. T. Oil Company has been incorporated here with a capital stock of $250,000, by E. Davis, H. Louderbach, A. L. Weil, M. Syme, and W. Walker.

LOS ANGELES, CAL.—The Black Pearl Oil & Asphalt Company has been incorporated here with a capital stock of $100,000, by T. F. Arundell, J. A. Grimes, and A. C. Tunka. Of the capital stock, $32,500 has been subscribed.

LOS ANGELES, CAL.—The Home Water Company has been incorporated here with a capital stock of $8,250, by S. S. Salisbury, C. V. Pepper, and others.

SANTA FE, N. M.—The El Paso Power & Light Company has filed its articles of incorporation in this territory, the head office in New Mexico being at Alamogordo, and the territorial agent being Herbert W. Wolcott. The company has an authorized capital stock of $1,000,000, and the incorporators are J. L. Lawson, A. F. Menger, and H. J. Stacey, all of Alamogordo.

TRANSMISSION.

SAN FRANCISCO, CAL.—C. N. Beal, who is associated with the Tevis interests in the water and power rights recently offered to San Francisco for a water system, states that the interests controlling these rights are out of the water business, and that these properties have been released from the contract with the Bay Cities Water Company, and will be developed for power purposes. Mr. Beal says that the owners have secured a market in advance for the power to be developed, but he refuses to say who the purchaser is. Rumor is to the effect that the electrifying of the Southern Pacific local lines will afford a market for this new source of power.

BAKERSFIELD, CAL.—Edwin Alderson has applied to the Board of Supervisors for a fifty-year franchise to erect poles and string wires along the county roads for the transmission of electric power. Bids for the franchise will be received till December 5th.

COLUSA, CAL.—Bids will be received till December 8th for a franchise as petitioned for by C. K. Sweet for transmission lines for electric power along the highways of Colusa County.

FRESNO, CAL.—Manager Wishon, of the San Joaquin Power Company, has arranged with the management of the Fresno Copper Mine to supply electric power to the latter company, to replace the steam power heretofore employed.

MEXICO CITY, MEX.—It is announced that the electric power plant of Cuesta Gallardo & Co. to be operated with water from the Rio Grande de Santiago, will be commenced within a month.

PASADENA, CAL.—The municipality is advertising for bids to be submitted on or before November 24th for forty 30-foot poles, twenty 35-foot poles, 4,000 pounds of No. 6 B. S. G. copper wire, 3,000 pounds No. 8 copper wire, and 1,000 pounds No. 10 copper wire.

SANTA BARBARA, CAL.—The municipality is advertising for 4,000 feet of copper-wire cable, and three 5-kilowatt transformers.

SPOKANE, WASH.—Sixteen million dollars, at the rate of $2,000,000 a year, will be expended by the Washington Water Power Company in extending its power, light and railway systems in Spokane and vicinity. Bonds to the amount of $15,000,000 are to be issued if authorized by the stockholders at a special meeting called by Henry M. Richards, president, for December 1st. The capital stock has been increased by $1,003,260, which is twenty per cent of the present capitalization, subscribed, of $5,016,300, making a total issue outstanding of $6,019,560. With the completion of its plan the company will have expended more than $20,000,000 in its Inland Empire enterprises, a major portion of that amount being represented by improvements in Spokane and immediate vicinity. The company conducts electric street railway lines throughout Spokane and vicinity and interurban lines to Medical Lake and Cheney, and distributes electric energy for lighting and power. The company has one of the longest transmission lines in the world, and delivers power to run the mines of the Coeur d'Alene Mining District, 130 miles east of Spokane. To furnish energy it has three stations in operation. There are two water plants at Spokane and Post Falls and a steam plant in Ross Park. Another important power station is under construction at Little Falls, thirteen miles north of Reardan, on the Spokane river. Officers and directors of the company are: President, Henry M. Richards, first vice-president, D. L. Huntington; second vice-president, A. B. Campbell; secretary, H. L. Bleecker; treasurer, H. E. Perks; directors, W. A. White, Frank Lyman, Hinsdill Parsons, Henry M. Richards, A. B. Campbell, D. L. Huntington, J. P. M. Richards, James N. Glover, J. D. Sherwood, L. M. Davenport, E. F. C. Van Dissel, George H. Southard, Francis S. Bangs, Theodore F. Hicks, and Harold T. White.

Jerome L. Drumheller, of Spokane, stockholder of the Sandpoint Water & Light Company and the Pend Oreille Electric Company, announces he has interested Chicago capital to the extent of $500,000 in the development of Moyie Falls on Moyie River, north of Sandpoint, Idaho. Engineers are at work now on final surveys, and a plant developing 10,000 horsepower will be built as soon as possible with the object of furnishing power for the panhandle of Idaho. The plans call for the expenditure of $500,000. Engineers are surveying for the development of 10,000 horsepower at Moyie Falls. Water will be taken out of the Moyie River at a point near Meadow Creek and will be carried five and a half miles to a height of nearly 500 feet. The flow of the stream is 300 cubic feet a second, under conditions developing greater power than the Spokane River. This power will be transmitted to Sandpoint during the coming year, and distributing lines will be built to Bonners Ferry and other North Idaho towns. The object is to meet the increasing demand for light and power in the panhandle of Idaho. In the next two years and a half the company plans to spend $600,000 in development in this field.

TRANSPORTATION.

BERKELEY, CAL.—Application has been made by Duncan McDuffie, of this city, for electric street railway franchises covering in part the same streets covered by the application of the Southern Pacific Company, a few days ago. It is reported that the applications of Mr. McDuffie are made in the interest of the Key Route, or of the Oakland Traction Company. The bids for the franchises will be opened on December 11th.

BERKELEY, CAL.—Property holders on Sacramento Street, in this city, have filed a petition protesting against the proposal of the Southern Pacific Company to lay a double-track street railroad on Sacramento Street.

BERKELEY, CAL.—The Oakland Traction and Key Route interests are rushing work on the new lines in Berkeley. The force of men on the Dwight Way cross-town line has been doubled, and it is reported that the Ashby Avenue line will be started at once.

SAN FRANCISCO, CAL.—The daily press publishes a dispatch from Reno, Nevada, giving a rumor that the Southern Pacific lines are to be operated by electricity from Sparks to San Francisco, and asserting that the Fleishhacker interests in power development along the Truckee River have been secured by Harriman.

SACRAMENTO, CAL.—It is reported here that the Clear Lake Railway Company and the Yolo County Consolidated Water Company are to be consolidated, and that following the consolidation an electric railway system will be built connecting the Napa Valley with the chief towns of Lake County. The plans include the building of a dam which will raise the level of Clear Lake and conserve a large quantity of water during the rainy season, for the operation of a power plant on Cache Creek, and for irrigation purposes.

SACRAMENTO, CAL.—The Vallejo & Northern Railway Company has secured a writ of mandate compelling the City Trustees of this city to take action on the company's application for a freight franchise. The company has selected a site for a depot on R Street, and has brought condemnation proceedings.

OCEAN PARK, CAL.—The City Trustees have granted to the Los Angeles Pacific Company a franchise for forty years on Laurel Avenue, from Trolleyway to the ocean.

SAN FRANCISCO, CAL.—General Manager Charles N. Black, of the United Railroads, has complied with the provision of the recently-enacted street-car ordinance to the extent of submitting to the Board of Supervisors the required schedule in force on the company's lines.

BELLINGHAM, WASH.—The County Commissioners recently granted to the Nooksack Valley Traction and Railway Company a franchise over the public highway between Lynden and Sumas on the same terms contained in the other franchise for interurban lines on the other county roads.

DAVENPORT, WASH.—It is reported that 50 per cent of the right of way for the Big Bend extension of the Inland Empire system has been secured between Davenport and Peach.

HOOD RIVER, ORE.—City Council is considering two applications for franchises. H. R. Langille, secretary Upper Hood River Development League, is promoting one, and proposes to build throughout the valley. C. A. Bell, representing another syndicate of local men, proposes to build on certain streets in Hood River. It has passed first reading.

PASCO, WASH.—Engineers are at work on the north and south electric line, projected to run from Kennewick north through White Bluffs, Priest Rapids and Beverly to the northern part of the Big Bend country. It is not known here what interests are promoting the north and south electric line. Howard Amon of the Benton Water Power Company, is said to be connected with the enterprise.

SEATTLE, WASH.—The Seattle Electric Co. has applied to the City Council for a franchise to parallel the lines of the Seattle, Renton & Southern into the Rainier Valley territory.

VANCOUVER, WASH.—The Vancouver Traction Company will extend its line twenty miles to LaCenter, at the head of Lewis River. Planning 100-mile electric system for Clarke County. A. Welch, manager. It seems barely possible that it will be extended to meet the Tacoma-Vancouver electric line in time.

WATERWORKS.

LOS ANGELES, CAL.—William Mulholland, chief engineer of the Owens River aqueduct, reports that during the month of October the Elizabeth Tunnel through the coast range of mountains was driven 466 feet through hard rock at a cost of $36.16 per foot. This surpassed the January record at the Gunnison Tunnel, by seventeen feet. The Elizabeth Tunnel is 12x12 feet, and on October 31st it had been driven 2,508 feet from the south portal. When completed the tunnel will be about five miles long. About 2,000 men are now at work on the aqueduct.

SAN RAFAEL, CAL.—Wallace Sayers, of Bolinas, has been here this week, arranging for the formation of a company to provide waterworks for Bolinas. His plans include the conserving of water, either in Week's Canyon or in Arroyo Honda. If the former site is chosen, a two-mile pipeline will be required, and if the latter is selected, a seven-mile line will be needed. He estimates that the cost of a plant of sufficient capacity to supply a town of 5,000 population would cost in the neighborhood of $25,000.

SAUSALITO, CAL.—President A. W. Foster, of the Marin County Water Company, says that his company will provide this city with an adequate supply of water whenever the citizens desire. He announces that the company has just bought the Porteous property for $55,000, thus greatly enlarging the water-shed of the company and making it capable of providing all the towns from Corte Madera to Sausalito with water, as well as the other towns reached by the company's mains.

TELEPHONE AND TELEGRAPH.

SAN FRANCISCO, CAL.—The Board of Harbor Commissioners has decided to deny the request of the Home Telephone Company for permission to erect poles and string wires on the State's property along the water front, and has informed the company that it will be given the right to use an underground conduit which the Board will have constructed for the use of all the companies which now have overhead wires on

the State's property or which contemplate transmitting electric energy along or across this property. Following this out, the Board has instructed Engineer Ralph Barker to prepare plans and specifications for a suitable underground conduit, with the idea of removing all overhead wires from East Street.

SAN FRANCISCO, CAL.—Mayor Taylor has vetoed the fire alarm box ordinance appropriating $5,500 for the manufacture by the city of fire alarm boxes of a type similar to those now in use in this city. The ordinance was passed by a vote of sixteen to two, and it is believed that the Mayor's veto will be overruled.

SAN FRANCISCO, CAL.—The Home Telephone Company will erect a one-story brick telephone exchange building on Albion Avenue and Seventeenth Street, at a cost of $25,000. The company has been granted permission to lay underground cables under school property at Bush and Stockton, and on Jackson Street.

RENO, NEV.—The last link in Clarence H. Mackay's Postal Telegraph Company, making it a transcontinental service, will be furnished by the connection with the Southern Nevada and Nevada Consolidated systems, which already have lines constructed from Rhyolite to Tonopah, and from Carson City to towns 100 miles south. This consolidation has been planned in secret for months, and Key Pittmann, president of the Southern Nevada concern, has left for New York to complete the terms with Mackay. The telegraph system will be operated with self-operating typewriters, invented so as to do away with operators, the typist pressing the machine's keys sending the message, which is received by a typewriter at the other end of the wire and mechanically reproduced.

COLVILLE, WASH.—George M. Welty, construction foreman for the Pacific Telephone Company, visited Colville recently and brought the news that the company has decided to expend $28,000 in construction and repair work on the lines and exchanges between Spokane and British Columbia, and work has already been started.

HOQUIAM, WASH.—Another telephone company has decided to invade the Grays Harbor country. It is the Northwestern Long Distance Telephone Company, and will be in operation by January 1, according to A. J. Pevestorf, superintendent of construction. The company has reached Centralia with its line and will come in this direction as rapidly as possible.

NORTH YAKIMA, WASH.—A franchise has been granted to W. F. Longmire for an independent telephone line, which will connect North Yakima with the Selah and Wenas Valleys, and connect, through them, to the Kittitas County line.

NORTH YAKIMA, WASH.—The White Bluffs and Columbia River Telephone Company has been organized and by means of its lines White Bluffs may communicate with the outside world via Kennewick. The tie will be 50 miles long and will include Hanford and Richmond.

SEATTLE, WASH.—Transfer of $150,000 from the general fund to the light and power fund, as a temporary loan, will be sufficient to finish the extension of the electric power pipe line from Cedar Lake to the power plant, and the new transmission line between the power plant and the city, according to Superintendent L. B. Youngs.

SPOKANE, WASH.—The Interstate Telephone Company will build a line to the coast, while the Home Telephone Company will look after the city phones.

TACOMA, WASH.—The Puyallup and Sumner line of the Home Telephone Company is being rushed towards completion. The Central Construction Company expects to finish the work so that telephonic service may be ready by January 1.

OIL.

LOS ANGELES, CAL.—The City Council has granted to the Union Oil Company a franchise for an oil pipe-line along certain streets of the city.

BAKERSFIELD, CAL.—I. Strassburger has transferred his lease on the southwest one-quarter of 30-31-23 to the Pioneer Midway Company, in which company he still has important holdings.

VISALIA, CAL.—Selma and Bakersfield people have begun sinking a well near Orosi, fifteen miles north of this place.

LOS ANGELES, CAL.—The Board of Public Works has advertised for bids for fuel oil, bids to be opened on November 20th. The oil is for use in the construction of the Owens River aqueduct.

HOLLISTER, CAL.—The Pone Oak Oil Company has abandoned the Sawyer oil field in this locality. The Standard Oil Company is boring at Peach Tree.

COALINGA, CAL.—The Record Oil Company, operating on section 22-19-15, has material on the ground for rigs Nos. 3 and 4, and is having casing hauled to this property.

BAKERSFIELD, CAL.—L. M. McCray, of Los Angeles, has leased for twenty years, on one-eighth royalty, from Lockwood & Britt, the northwest quarter of section 16-32-23, just north of the property of the Lockwood Oil Company, on the same section.

ILLUMINATION.

MONROVIA, CAL.—A committee has been appointed to investigate the advisability of the installation of a municipal electric lighting plant.

HEALDSBURG, CAL.—The city authorities will receive bids till November 23rd for one 150-kilowatt generator for the municipal light and water plant. On the same date bids will be opened for a 200-horsepower water-wheel for the city's plant.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company began work, on November 12th, on its pipeline to La Jolla.

LONG BEACH, CAL.—B. F. Pierson and H. W. Burkhart, head of the gas engineering department of the Edison Electric Company, having selected a site for the company's proposed high-pressure gas plant at this place.

IMPERIAL, CAL.—The Imperial Gas Improvement Company has made final arrangements to go ahead with the installation of a gas plant at this place.

SANTA BARBARA, CAL.—The Merchants' Mutual Light and Power Company is preparing to lay a new pipe line from its plant at Mason Street and Gray Avenue to the water front.

WEAVERVILLE, CAL.—The Weaverville Electric Company is planning to increase the capacity of its electric lighting plant by securing an increase in the supply of water. It it planned to keep the plant in operation day and night instead of during the night only as at present.

PASADENA, CAL.—The City Council has awarded to B. F. Kierulff, Jr. & Co., a $1050 contract for three braid wire for the electrical department.

SAN FRANCISCO, CAL.—E. C. Jones, head of the engineering department of the San Francisco Gas and Electric Company, in the legal proceedings now under way, said that it would cost $11,000,000 to duplicate the company's distributing system in this city.

REDDING, CAL.—The Superior Court has again decided in favor of the farmers holding riparian rights on Cow Creek as against the Northern Light and Power Company, which has sought to condemn these riparian rights for the use of the company.

REDWOOD CITY, CAL.—The City Trustees have decided in favor of extending the lighting system into Wellesley and Dingee Parks, and have instructed the Clerk to advertise for bids for the materials needed for the proposed extension.